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Western- and Eastern-type ophiolite classification of the Mirdita zone, Albania - a reappraisal based on comparisons with Appalachian ophiolites and modern oceanic settings

A. Tremblay (1), A. Meshi (2), P. Pagé (3) and J.H. Bédard (4)

(1) Département des Sciences de la Terre et de l'Atmosphère, Université du Québec à Montréal, Canada, (2) Faculty of Geology, Politechnic University of Tirana, Albania, (3) Département des Sciences appliquées, Université du Québec à Chicoutimi, Canada, (4) Natural Resources Canada, GSC-Québec, Québec city, Canada (tremblay.a@uqam.ca)

In modern oceanic settings, slow- to intermediate-spreading ridges are characterized by an episodic magma supply. Periods of amagmatic extension allow the lower crust and upper mantle to be exhumed to the seafloor along low-angle detachments and high-angle normal faults. These exhumed peridotite massifs are referred to as oceanic core complexes and typically occur at the inside corners of 1st order discontinuities along the ridge axis. The exhumation process also accounts for the occurrence of oceanic lithosphere with thin or missing upper crust. Such structures are common along the mid-Atlantic ridge, for instance, and should be expected to occur in ophiolites, at least in those formed along slow-spreading ridges. In Albania, the Mirdita zone exposes two segments of Jurassic ophiolites referred to as the Western-type and Eastern-type belts. The Mirdita zone was only slightly affected by the Alpine orogeny, and the ophiolite belts thus display structures that are mostly related to the primary oceanic setting and subsequent obduction onto Apulia. The Western and Eastern belts, which are interpreted as typical Lherzolite- and Harzburgite-type ophiolites, respectively, differ by (1) a contrasting mantle composition, (2) the occurrence of a well-preserved transition zone in the Eastern belt, (3) the thickness of their respective crustal sequences, and (4) the composition of the overlying basaltic series. The structure of the Western-type belt suggests, however, that the mantle has been exhumed before obduction and that it represents a fossil oceanic core complex. Lo-

cally, the lower crust was totally excised, and exhumation-related shear zones are preserved both in the mantle and at the interface with overlying basalts. The ophiolitic sediments lie on basalts, sheeted dykes, or gabbros, and consist of debris flows and slumped oceanic deposits. In the Canadian Appalachians, the Southern Québec ophiolites record an Ordovican suprasubduction zone setting and are interpreted as the remnants of a slow-spreading ridge environment. These ophiolites were folded and faulted twice after obduction onto Laurentia and primary relationships between the mantle, the crust and overlying sediments are obscured by the superimposed orogenic structures. However, some ophiolites preserve evidence for pre-obduction exhumation, showing strong similarities with the Albanian Western-type belt. Syn-magmatic normal faults, marked by lateral changes in the composition and thickness of crustal rocks, have been documented. Some of these faults propagated down into the mantle and may have been associated with exhumation. The base of the ophiolitic sedimentary sequence, mostly made up of polygenic debris flows, is a major erosional unconformity which penetrates down to the lower crust and upper mantle. The lithological and structural characteristics of both the Mirdita zone and the Southern Québec ophiolites Belt are consistent with the local predominance of extensional tectonics, crustal excision, and lower crust/upper mantle exhumation during oceanic crust formation and the deposition of overlying sedimentary rocks. We suggest that the localized occurrence of oceanic core complexes may account for the complex pseudo-stratigraphy of these ophiolites. In Albania, we think that the Western and Eastern belts represent a single composite slab of oceanic lithosphere (i.e. the Mirdita ophiolite), and suggest that they be called the Lower- and Upper-Plate belts, respectively.